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II. *Some Particulars in the Anatomy of a Whale.* By Mr. John Abernethy. Communicated by Everard Home, Esq. F. R. S.

Read November 26, 1795.

THERE are some particulars in the anatomy of the whale, which, I believe, have either entirely escaped observation, or have not been as yet communicated to the public. The parts which in the whale correspond in situation and office with the mesenteric glands of other animals, differ considerably from those glands in structure. These peculiarities are not only curious in themselves, but are illustrative of circumstances, hitherto esteemed obscure, in the anatomy and œconomy of the lymphatic glands in general. I therefore take the liberty of submitting the following account of them to the inspection of this learned Society.

The animal, from which the parts that I am going to describe were taken, was a male, of the genus named by LINNÆUS *balæna*.

Being desirous of making an anatomical preparation, to shew the distribution of the mesenteric vessels and lacteals of the whale, I procured for this purpose a broad portion of the mesentery with the annexed intestine; and proceeded in the first place to inject the blood vessels. The mesentery had been cut from the animal as close to the spine as possible:

had a less portion been taken away, the parts which I am about to describe would have been left with the body, for they are situated upon the origin of the blood vessels belonging to the intestines ; and this, perhaps, is the reason why they have not been observed before.

When I threw a red-coloured waxen injection into the mesenteric artery, I saw it meandering in the ramifications of that vessel ; but at the same time I observed it collecting in several separate heaps, about the root of the mesentery, which soon increased to the size of eggs. At the time, I imagined that the vessels had been ruptured, and that the injection in consequence had become extravasated ; but I was conscious that no improper degree of force had been used in propelling the injection.

I next threw some yellow injection into the vein, when similar phænomena occurred ; the branches of the vein were filled, but at the same time the masses of wax near the root of the mesentery were increased by a further effusion of the injection. These lumps had now acquired a spherical form, and some of them were of the size of an orange.

After the injection had become cold, I cut into the mesentery, in order to remove these balls of wax ; when I found that they were contained in bags, in which I also observed a slimy and bloody-coloured fluid. On the inner surface of these bags a great number of small arteries and veins terminated ; from the mouths of which the injection had poured into their cavities. There were seven of these bags in that piece of mesentery which I had to examine ; but I am not able to determine what number belonged to the animal ; for I do not know whether the portion of mesentery that I possessed

was complete. Having removed the injection from these bags, I observed on the inside of them a soft whitish substance, apparently containing a plexus of lacteal vessels. This substance entered the bags at that part of them which was nearest to the intestines, and went out at the part next to the spine. I now poured some quicksilver into those lacteals which appeared to lead to this soft substance: the quicksilver soon entered the vessels which were contained in it, and thus its nature was ascertained. A number of lacteals having entered one of these bags, were observed to communicate with each other, then again to separate, and form other vessels, which went out of the bag. It was some time before the quicksilver passed through the plexus of vessels contained in the first bag; but after having pervaded it, it passed on to a second bag, in which was concealed a similar plexus of lacteals. The quicksilver permeated these last vessels with much greater facility than it did the former, and quickly ran out of the large lacteals which were divided at the origin of the mesentery. Besides those absorbents which passed through the bags in the manner described, there were great numbers of others, which terminated by open orifices in every part of them. When quicksilver was poured into any of the lacteals, which were found near the sides of the bags, it immediately ran in a stream into their cavities. I introduced about a dozen bristles through as many lacteals, into different parts of two of these bags. These were doubtless few, in comparison to the whole number which terminated in them, but as the mesentery was fat, and the vessels were small, more could not easily be passed.

I afterwards stuffed two of the bags with horse-hair, dried them, and preserved them as an anatomical preparation. In

this state great numbers of arteries and veins, but chiefly of the former vessels, are seen terminating on their inside, in the same indistinct manner as the foramina Thebesii appear when the cavities of the heart are laid open: the bristles also render visible the termination of a certain number of lacteals. I examined the sides of these bags, which were moderately thick and firm; but I did not see any thing which, from its appearance, I could call a muscular structure.

From the circumstances that have been related, it appears, that in the whale there are two ways by which the chyle can pass from the intestines into the thoracic duct; one of these is through those lacteals, which pour the absorbed chyle into bags, in which it receives an addition of animal fluids. The other passage for the chyle is through those lacteals which form a plexus on the inside of the bags; through these vessels it passes with some difficulty, on account of their communications with each other; and it is conveyed by them to the thoracic duct, in the same state that it was when first imbibed from the intestines. The lacteals, which pour the chyle into the bags, are similar to those which terminate in the cells of the mesenteric glands of other animals: there is also an analogy between the distribution of the lacteals on the inside of these bags, and that which we sometimes observe on the outside of the lymphatic glands in general. In either case, a certain number of the vasa inferentia, as they are termed, communicate with one another, and with other vessels, named vasa efferentia.

By this communication, the progress of the fluids contained in these vessels is in some degree checked; which impediment increases the effusion into the cavities of the gland made by

the other lacteals: but should these cavities be obstructed, from disease, or other causes, an increased determination of fluids into the communicating absorbents must happen, which would overcome the resistance produced by their mutual inosculation, and the contents of the vessels would be driven forwards towards the trunk of the system. In the whale, as in other animals, we find that the impediment, occasioned by this communication of lacteals, is greatest in the first glands at which they arrive after having left the intestines.

The ready termination of so many arteries in the mesenteric glands of the whale, makes it appear probable, that there is a copious secretion of fluids mixed with the absorbed chyle; and, as I have before observed, a slimy bloody-coloured fluid was found in them. As the orifices of the veins were open, it appears probable that the contents of the bags might pass in some degree into those vessels.

The eminent anatomists, ALBINUS, MECKEL, HEWSON, and WRISBERG, were of opinion, that the lymphatic glands were not cellular, but were composed of convoluted absorbing vessels. This notion seems, however, to have been gradually declining.

Mr. CRUIKSHANK has of late publicly maintained a contrary opinion; and has shewn, that the cells of these glands have transverse communications with each other; which it is not likely they would have, if they were only the sections of convoluted vessels. Some additional observations have occurred to me, confirming this opinion, and which, as I believe they have not been publicly noticed by others, I beg leave to relate to this Society. I have injected the lymphatic glands of the groin and axilla of horses, with wax, and afterwards destroyed

the animal substance, by immersing them in muriatic acid. In some of these glands the wax appeared in very small portions, and irregularly conjoined ; which is a convincing proof, that it had acquired this irregular form from having been impelled into numerous minute cells. But in several instances, I found one solid lump of wax, after the destruction of the animal substance : and it appears to me sufficiently clear, that the glands which were filled in this manner, were formed internally of one cavity, and were not, as is commonly the case, composed of many minute cells. I have also filled glands of this structure, in the mesentery of an horse, with quicksilver : I have then dried them, cut open the bags, and introduced a bristle into them through the *vas inferens*. And in the human mesentery, after having injected the artery, I have filled a bag resembling a gland, with quicksilver ; which being opened, a mixture of injection and quicksilver was found in its cavity.

That the lymphatic glands in most animals are cellular, may not, perhaps, be hereafter doubted : that they are sometimes mere bags, analogy and actual observation induce me to believe. It might be said, that in those instances which I have related, the cells were burst, or that the glands were diseased : to which I can only reply, that there was no appearance to lead me to such a conclusion.

If, then, the lymphatic glands are either cellular, or receptacles resembling bags for the absorbed fluids, we are naturally led to inquire, what advantage arises from this temporary effusion of the contents of the absorbents. That there is a considerable quantity of fluids poured forth from the arteries of the whale, to mix with the absorbed chyle, is very

evident ; nor can it be doubted that the same thing happens in other animals ; for the cells of the lymphatic glands are easily inflated, and injected from the arteries.

The ready communication of these bags with the veins of the whale, induced me to examine whether I could ascertain any thing similar in other animals. Air impelled into the lymphatic glands, however, seldom gets into the veins ; sometimes indeed veins are injected from these glands ; but when this has occurred to me, I have observed an absorbent arising from the gland, and terminating in the adjacent vein.

These remarks, perhaps, may not be very important ; such, however, is the nature of the subject, that all the knowledge we have hitherto obtained of the absorbing vessels has been acquired by fragments, and all our future acquisitions must be made in the same manner : I have wished, therefore, by offering these observations, to contribute my mite to the general stock of our knowledge of this subject.